follow the ink that was just automatically scrolled up. If such an event is true, the new ink would be being written on the current last line, since the preceding ink was formerly on the last line. Step **1308** tests for this condition by obtaining the current line status from the ink parser mechanism **70**, whereby if the user is writing anywhere but the last line, the process returns to FIG. **12** where the new ink will be left as is. Similarly, if the new ink was intended to be directly after the just-scrolled ink, it would be to the right thereof. Step **1310** tests for this condition by analyzing the x-coordinates of the scrolled ink and the pendown position, whereby if not to the right of the scrolled ink, the process returns to FIG. **12** and the new ink remains as is.

Steps **1312–1314** await a pen-up event and test for the presence of any new ink between the last and scrolled lines when the user has completed the writing of this next set of ink. For example, it is possible that the user has intended to draw a sketch by placing the pen in the lower right corner and moving it generally upward. Such activity would satisfy the previous tests of steps **1304**, **1308** and **1310**, but would not be intended to follow the previously scrolled ink. Note that it is also possible at this time to query the ink parser mechanism **70** to determine if the user has written what appears to be a word, and if not, the new ink may be left alone. Also, it is possible that the user was quick enough to start writing on the new blank lines before returning to the lower right corner. If so, this new ink should be left in its current position relative to the scrolled ink. However, if the user has not written anywhere but the last line, the new ink is moved when the user finishes writing it, as represented by steps **1314** and **1316**. This is shown via the word "is" in FIG. **6** being moved up as shown in FIG. **7**.

In sum, the autoscroll mechanism **72** provides a four-part test before moving the ink for the user, a test of the time before the next writing, a test for the last line, a test for the horizontal position exceeding the previous ink's horizontal position, and a test for other ink written to the newly available lines. As can be readily appreciated, the tests determine the user's likely intent with respect to newly input ink, and thus further increase the perceived intelligence of the automatic scrolling operation of the present invention.

FIG. **8** represents the determination of a threshold time (step **1206**) based on the x-coordinate of the writing when the user lifts the pen. In FIG. **8**, the last line is logically divided into four quadrants, represented by the dashed lines (not seen by the user). Each quadrant has a threshold time associated therewith, shown as T_1–T_4. For example, time T_1 may be one-and-one half seconds, time T_2 one-and-one quarter seconds, time T_3 one second and time T_4 three-quarters of a second. In the implementation represented in FIG. **8**, the threshold time is the value associated with the quadrant in which the user lifted the pen.

FIG. **9** shows ink written to a screen having a different zoom percentage such that only three lines are available for writing. FIG. **10** shows how the x-coordinate-based threshold time may be further varied based on the zoom percentage, for example, instead of quadrants there are only two zones, with threshold times T_1 and T_2. Lastly, FIG. **11** shows how the amount of automatic scrolling may be changed based on the zoom percentage, for example two lines instead of three since scrolling more than two lines would leave a blank screen and would thus be generally undesirable. In general, each of these features further increases the intelligence perceived by the user with respect to the automatic scrolling operation.

Lastly, while the present invention provides many benefits for hand-held and palm-sized computing devices and thus has primarily been described above with respect thereto, it should be understood that the present invention may be implemented in virtually any computing environment capable of receiving user pen input. Indeed, the present invention has been implemented on a desktop personal computer with a tablet device connected thereto.

As can be seen from the foregoing detailed description, there is provided a method for automatically scrolling hand-written user input. The method is flexible, intelligent and may adapt to the user.

While the invention is susceptible to various modifications and alternative constructions, certain illustrated embodiments thereof are shown in the drawings and have been described above in detail. It should be understood, however, that there is no intention to limit the invention to the specific form or forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the spirit and scope of the invention.

What is claimed is:

1. In a computer system having a program for receiving ink written by a user, a method of automatically scrolling the ink, comprising the steps of, determining when the ink has achieved a scroll point, detecting a pause in user writing, comparing a duration of the pause against a threshold time, and if the threshold time is achieved, scrolling the ink.

2. The method of claim **1** wherein the step of determining when the ink has achieved the scroll point includes the step of determining when the user is writing on a last line.

3. The method of claim **1** wherein the step of determining when the ink has achieved the scroll point includes the step of querying a mechanism for parsing the ink.

4. The method of claim **1** wherein the step of detecting the pause in user writing comprises the step of receiving a pen up event.

5. The method of claim **1** wherein the step of comparing a duration of the pause against a threshold time includes the step of starting a timer in response to detecting the pause.

6. The method of claim **5** wherein the step of starting the timer comprises the step of storing a time stamp.

7. The method of claim **1** further comprising the step of determining the threshold time based on one or more criteria.

8. The method of claim **7** wherein the threshold time is determined on one or more criteria including an x-coordinate of the ink.

9. The method of claim **8** wherein the threshold time is determined as a first value if the pause corresponds to an x-coordinate below a predetermined number, and determined as a second value if the pause corresponds to an x-coordinate above the predetermined number.

10. The method of claim **8** wherein the threshold time is inversely related to the x-coordinate that corresponds to the pause.

11. The method of claim **8** wherein the threshold time is one of four values selected based on the x-coordinate that corresponds to the pause.

12. The method of claim **7** wherein the threshold time is determined on one or more criteria including a zoom percentage.

13. The method of claim **7** wherein the threshold time is determined on one or more criteria including a writing speed of the user.

14. The method of claim **7** wherein the threshold time is determined on one or more criteria including an x-coordinate of the ink and a zoom percentage.

15. The method of claim **7** wherein the threshold time is determined on one or more criteria including an x-coordinate of the ink and a writing speed of the user.